

Energy Transformation Notes

Energy – ability to cause change

EVERYTIME A CHANGE OCCURS ENERGY IS PRESENT

Law of Conservation of Energy – Energy can *NEVER* be created or destroyed, only transferred




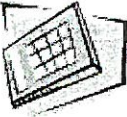













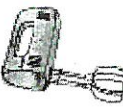






Examples:

- Solar calculator (light to electrical)
- Windmill (mechanical to electrical)
- Glow stick (chemical to light)
- Firecracker (chemical to sound and light)

Turbine – device used to change energy sources into useable electricity by rotating it

- Any time electricity needs to be used it requires the use of a turbine

Energy Transformation Game

Sun 	Windmill 	Microwave 	Solar Calculator 	Crane 	Satellite Dish 	Siren 
Tanning Bed 	Nuclear Power Plant 	Hot-air Balloon 	Magnifying Glass 	Candle 	Electric Guitar 	Firecracker 
Battery 	Piano 	Light Bulb 	Mixer 	Iron 	Lightstick 	Bicycle 
Television 	Person Eating 	Plant 				

Em = Electromagnetic

T = Thermal

E = Electrical

C = Chemical

N = Nuclear

Mp = Mechanical (potential)

Mk = Mechanical (kinetic)

FORMS OF ENERGY

All forms of energy fall under two categories

POTENTIAL

Potential energy is stored energy and the energy of position (gravitational)



CHEMICAL ENERGY

Chemical energy is the energy stored in the bonds of atoms and molecules. Biomass, petroleum, natural gas, propane and coal are examples of stored chemical energy.

NUCLEAR ENERGY

Nuclear energy is the energy stored in the nucleus of an atom. It is the energy that holds the nucleus together. The nucleus of a uranium atom is an example of nuclear energy.

STORED MECHANICAL ENERGY

Stored mechanical energy is energy stored in objects by the application of a force. Compressed springs and stretched rubber bands are examples of stored mechanical energy.

GRAVITATIONAL ENERGY

Gravitational energy is the energy of place or position. Water in a reservoir behind a hydropower dam is an example of gravitational potential energy. When the water is released to spin the turbines, it becomes kinetic energy.

KINETIC

Kinetic energy is energy in motion. It is the motion of waves, electrons, atoms, molecules and substances



RADIANT ENERGY

Radiant energy is electromagnetic energy that travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays and radio waves. Solar energy is an example of radiant energy.

THERMAL ENERGY

Thermal energy (or heat) is the internal energy in substances; it is the vibration and movement of atoms and molecules within substances. Geothermal energy is an example of thermal energy.

MOTION

The movement of objects or substances from one place to another is motion. Wind and hydropower are examples of motion.

SOUND

Sound is the movement of energy through substances in longitudinal (compression/rarefaction) waves.

ELECTRICAL ENERGY

Electrical energy is the movement of electrons. Lightning and electricity are examples of electrical energy.

Energy Transformation Worksheet

Identify the different types of energy transformation in each of the pictures

Record the answer to each question (10 points each) in your science notebook on page 12a (or right after your energy foldable notes)



1) **Windmill**
Energy Transformation:



2) **Flashlight**
Energy Transformation:



3) **Microwave**
Energy Transformation:



4) **Firecracker**
Energy Transformation:



5) **Bicycle**
Energy Transformation:



6) **Battery**
Energy Transformation:

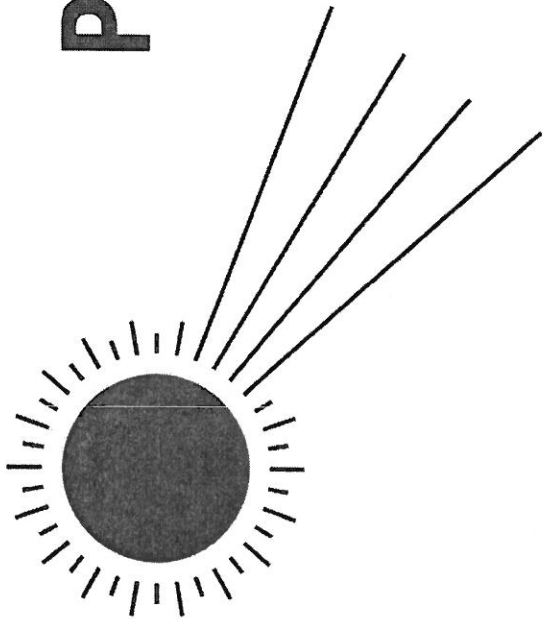
Give an example where the following energy changes would take place:

7) Electrical to Thermal _____

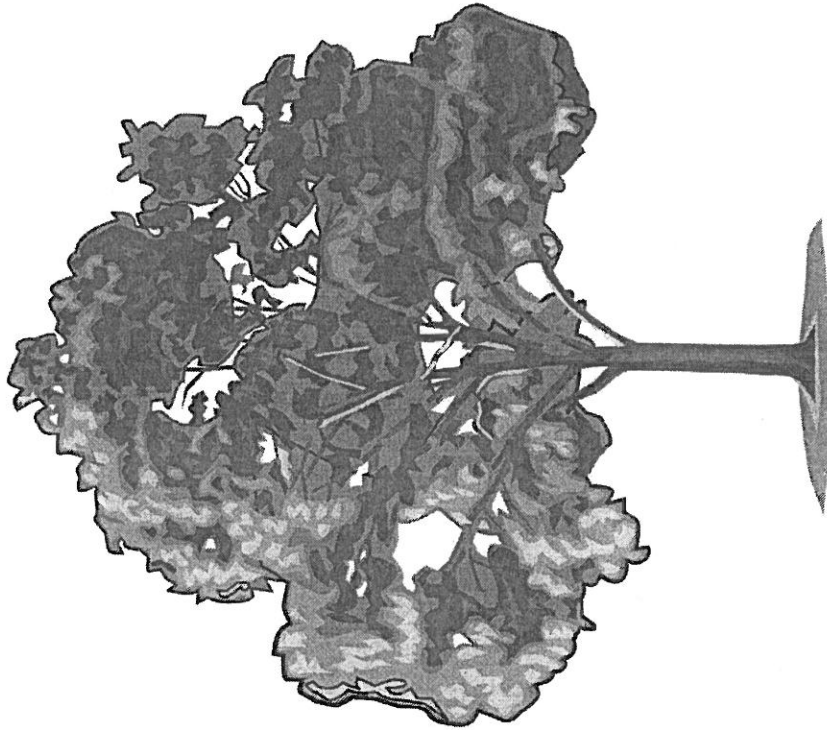
8) Chemical to Thermal _____

9) Electrical to Mechanical _____

10) Radiant to Chemical _____



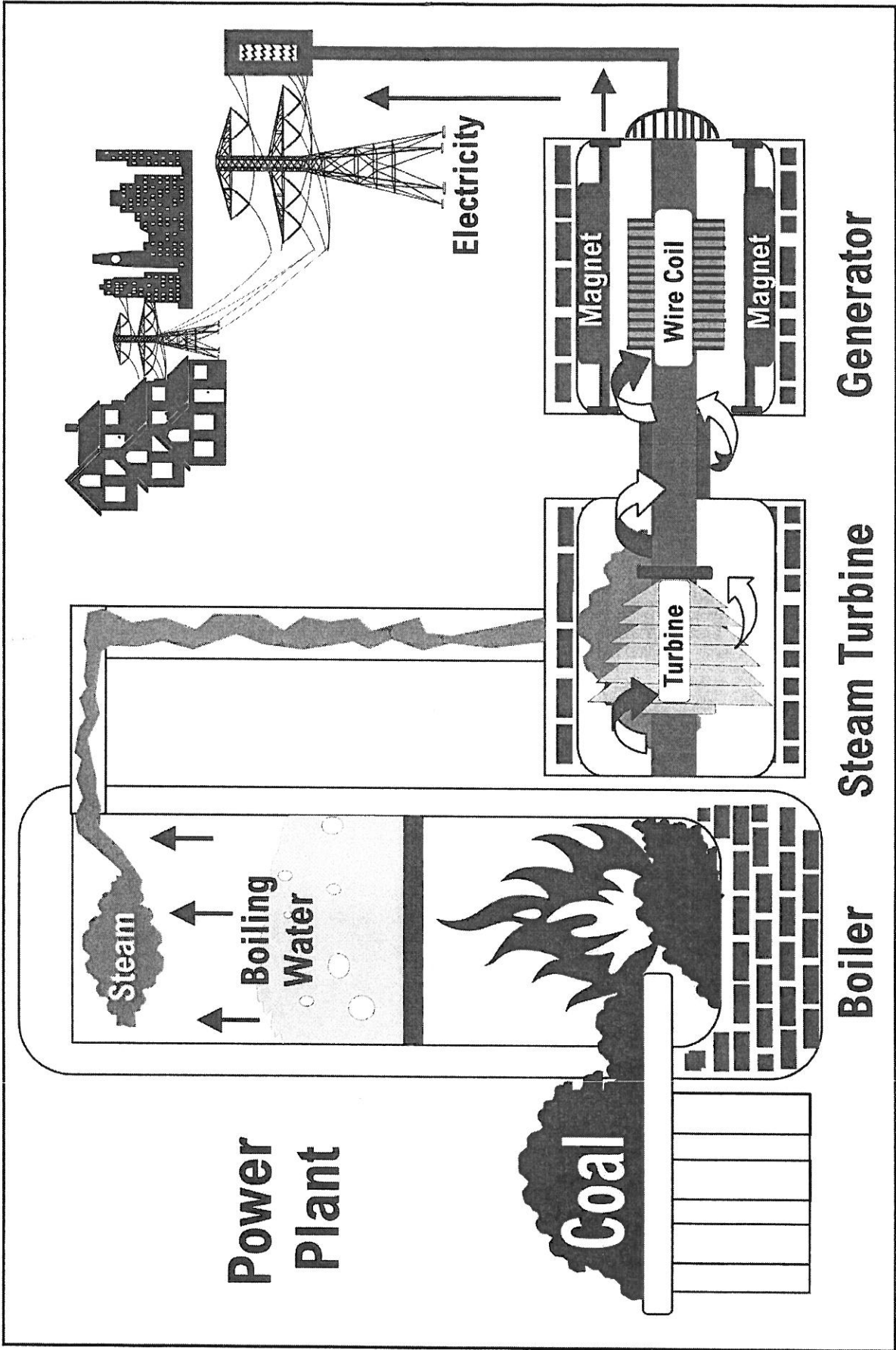
PHOTOSYNTHESIS



In the process of photosynthesis, plants convert radiant energy from the sun into chemical energy in the form of glucose, or sugar.



BURNING COAL TO MAKE ELECTRICITY



Support activities – Concept review

E&S5

Concept review: energy transformations, forms of energy, natural energy sources, renewable and nonrenewable energy sources

Energy

1. Complete the sentences, using the words in the box below. You will not need all the words.

- | | | | |
|----------|----------------|-------------|------------------|
| • change | • movement | • renewable | • transfer |
| • forms | • nonrenewable | • sources | • transformation |

a) Energy is the ability to effect _____. There are many natural sources of energy: solar energy, hydraulic energy, tidal energy, energy from waves and ocean currents, wind energy, biomass, fossil energy, geothermal energy and nuclear energy.

b) A _____ energy source is a source of energy that is regenerated naturally and in sufficient quantities compared to its rate of use. A _____ energy source is a source of energy that is not regenerated naturally or that is not regenerated in sufficient quantities compared to its rate of use.

c) Energy _____ is the changing of energy from one form to another. Energy _____ is the movement of energy from one place to another.

d) Energy exists in many _____, including thermal energy, radiation energy, chemical energy and mechanical energy.

2. What form of energy fits each of the following descriptions?

a) energy derived from the speed of an object, its mass and its position in relation to objects around it

b) energy stored in molecular bonds

c) energy contained in and carried by an electromagnetic wave

d) energy derived from the random motion of all the particles in a substance

3. Match each of the following forms of energy with the correct description.

- | | | | |
|---------------|---|---|---|
| a) wind | • | • | A. energy from moving water |
| b) fossil | • | • | B. energy stored in air masses and harnessed from the wind |
| c) hydraulic | • | • | C. energy from chemical elements such as uranium |
| d) solar | • | • | D. energy from the transformation of plants into mineral substances |
| e) tidal | • | • | E. energy from the tides |
| f) geothermal | • | • | F. energy from the sun's rays |
| g) nuclear | • | • | G. energy from the Earth's internal heat |

4. Check the energy sources that are renewable.

- | | | | |
|----------------------|--------------------------|---------------------|--------------------------|
| a) geothermal energy | <input type="checkbox"/> | e) hydraulic energy | <input type="checkbox"/> |
| b) solar energy | <input type="checkbox"/> | f) wind energy | <input type="checkbox"/> |
| c) fossil energies | <input type="checkbox"/> | g) nuclear energy | <input type="checkbox"/> |
| d) tidal energy | <input type="checkbox"/> | | |

5. What form of energy is used in each of the following situations?

- | | |
|---|-------|
| a) A lamp lights up the room. | _____ |
| b) An apple gives me energy. | _____ |
| c) The ball my brother threw broke the window. | _____ |
| d) I use the microwave oven to warm up my soup. | _____ |
| e) The sun melts the snow in the spring. | _____ |

6. For each of the following statements, write the form of energy that will result from the energy transformation described.

- | | |
|--|-------|
| a) You turn on an electric radiator. | _____ |
| b) Gas powers your car. | _____ |
| c) The nuclear power plant begins operation. | _____ |